



State of Louisiana

**Coastal Protection and Restoration
Authority of Louisiana (CPRA)**

2016/2017 Annual Inspection Report

for

HWY 384 HYDROLOGIC RESTORATION PROJECT (CS-21)

State Project Number CS-21
Priority Project List 2

March 23, 2017
Cameron Parish

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I. Introduction

The Hwy. 384 Hydrologic Restoration project (State Project No. CS-21) is located in the Calcasieu-Sabine Basin on the northeast side of Calcasieu Lake in Cameron Parish. The 975 acre project area extends from the northeast shore of Calcasieu Lake in a southeasterly direction to the Gulf Intracoastal Waterway and generally parallels LA Hwy. 384 in the vicinity of the Grand Lake community. The area is bounded on the north and south by higher elevation prairie formations. (See Appendix A).

The Hwy. 384 Hydrologic Restoration Project was authorized by Section 303(a) of Title III Public Law 101-646, the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA) enacted on November 29, 1990 as amended and approved on the second Priority Project List. The Hwy. 384 Project has a twenty-year (20 year) project life, which began in January 2000.

II. Inspection Purpose and Procedures

The purpose of the annual inspection of the Hwy. 384 Hydrologic Restoration Project (CS-21) is to evaluate the constructed project features to identify any deficiencies and prepare a report detailing the condition of project features and recommended corrective actions needed. Should it be determined that corrective actions are needed, CPRA shall provide, in the report, a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs (O&M Plan, 2003). The annual inspection report also contains a summary of maintenance projects, if any, which were completed since completion of constructed project features and an estimated projected budget for the upcoming three (3) years for operation, maintenance and rehabilitation. The three (3) year projected operation and maintenance budget is shown in Appendix C.

An inspection of the Hwy. 384 Hydrologic Restoration Project (CS-21) was held on March 23, 2017 under sunny and mild conditions. The water level was very low due to a north wind and front moving through the area. In attendance were Jody Roger-White and Stanley Aucoin of CPRA, Dale Garber of NRCS, and Operations Contractor, Chris Simon with Simon and Delany. The annual inspection began at approximately 10:20 a.m. at Structure No. 1.

The field inspection included a complete visual inspection of the project features. Staff gauge readings where available were used to determine approximate elevations of water, rock plugs, earthen embankments, and other project features. Photographs were taken at each project feature (See Appendix B) and Field Inspection Notes were completed in the field to record measurements and deficiencies (See Appendix D).

III. Project Description and History

Historically, the western portion of the project area was intermediate marsh with slightly brackish marsh immediately adjacent to Calcasieu Lake (U. S. Department of Agriculture, Natural Resources Conservation Service [USDA/NRCS] 1995, 1996a, 1996b). The eastern

portion of the project area was fresh marsh up to the GIWW. In the late 1980's, Chabreck and Linscombe (1988) characterized the La. Highway 384 wetlands as brackish and intermediate.

Increased tidal volumes, enlargement of tidal exchange routes, and salt water intrusion resulting from human-induced changes to the area's hydrology are the primary causes of wetland loss in the project area (Louisiana Coastal Wetlands Conservation and Restoration Task Force [LCWCRTF] 1993). The Calcasieu Ship Channel was constructed in 1941 and redredged to its current depth of 40 ft (12.2 m) and bottom width of 400 ft (122 m) in 1968 (Good et al. 1995). This channel radically altered the area's hydrology by increasing the height and duration of tidal fluctuations, which in turn increased water levels and saltwater intrusion into the low salinity marshes surrounding Calcasieu Lake (Suhayda et al. 1988). Spoil banks along the GIWW, constructed in the 1940's, have effectively blocked the project area's historical connection to the Mermentau River Basin, and now block off the major source of freshwater for the project area, the GIWW East of Calcasieu Lock. Construction of a drainage canal through the project area prior to 1940, and construction of an oil field road before 1963 both provided hydrologic exchange points connecting the fragile interior marsh soils of the project area to Calcasieu Lake (USDA/NRCS 1995, 1996a, 1996b).

Hydrologic exchange between the project area and Calcasieu Lake allowed salt water to eradicate much of the non-salt tolerant emergent vegetation, exposing the fragile organic surface layer of the marsh soil to erosion and tidal scour. As a result, the organic surface layer has been largely transported out of the project area and into Calcasieu Lake. The loss in elevation of the soil surface provided by the organic surface layer of the soil has led to prolonged inundation of the emergent vegetation, which causes die-back of many wetland plant species (Mendelssohn and McKee 1988), and finally, the conversion of emergent marsh to open water (Gosselink et al. 1979).

Construction of the Hwy. 384 Hydrologic Restoration Project was completed in January 2000. The project has a 20-year project life which began in January 2000.

The principal project features include:

- Structure No.1 (Freshwater Introduction Structure) - 3-24" Aluminum culverts with Interior 24" Flapgates and Exterior 24" Sluice Gates.
- Structure No. 12 (Salinity Control Structure) - 2-48" Aluminum culverts, each w/ an Interior 10' Variable-Crested Weir Inlet with a 4" vertical slot and an Exterior 48" Flapgate.
- Site No.8 (Rock Plug) - Approximately 100 linear feet of earth fill and rock plug on the eastern shore of Calcasieu Lake.
- Existing Access Road No. 1 (West of Hwy 384) - approximately 4,000 linear feet in length, which serves as a hydrologic boundary on the northwestern edge of the project boundary between La. Hwy 384 and Calcasieu Lake.
- Existing Access Road No. 2 (East of Hwy 384) - approximately 6,000 linear feet in length, which serves as a hydrologic boundary on the southeastern edge of the project boundary between La. Hwy. 384 and the Gulf Intracoastal Waterway.

IV. Summary of Past Operation and Maintenance Projects

General Maintenance: Several maintenance projects have been completed since the original project's construction completion. Engineering and design as well as construction oversight on some of these maintenance projects were provided by Abbeville/Lafayette field office personnel so no exact costs related to these activities are available. The maintenance projects that were performed were as follows:

Nov. 2000- Glenn Lege Construction

- Placed 40.32 cy. of #610 limestone on the road near Structure #12 due to some overtopping of the road during high tidal events
- Placed 12 cy. of man size rip-rap on the inlet side of Structure #12 due to some scouring of the bankline around the structure.

TOTAL CONSTRUCTION COST- \$3,461.14

June 2002- Glenn Lege Construction

- Provided labor and materials to construct a "hyacinth fence" on the inlet side of Structure No. 1. The fence is constructed of galvanized woven wire and CCA treated timber piles and whalers.
- Provided labor and materials to reinforce the existing levee around Structure No. 1 with graded crushed stone.
- Provided labor and materials to repair the rock plug at Site No. 8 that had been leaking and also had been vandalized. The plug was repaired by hauling in earth fill from an off-site location and pushing it over the existing rock plug with a bulldozer. The earthen plug was then planted under separate contract by DNR plantings group.

TOTAL CONSTRUCTION COST- \$14,386.87

February 2004 – Lonnie G. Harper and Associates

Provided a survey of the existing shoreline to determine lake rim elevations within the project area along the eastern side of Calcasieu Lake.

TOTAL COST- \$3,345.00

May 2005- Bertucci Construction

Provided labor, material and equipment to repair thirteen linear feet of the rock plug at Site No. 8. The rock was removed by vandals. 39.9 tons of 1200# rip rap stone was used to repair the thirteen foot gap. A four foot thick layer of 150# stone was applied to the marsh side slope of the plug to prevent water flow through the plug. This required 343.4 tons of rock. Completion and final acceptance was on May 15, 2005.

TOTAL CONSTRUCTION COST- \$45,090.00

May 2006- F. Miller & Sons

Provided labor, material and equipment to repair the existing access roads to permit elevations (+3.0 on Existing Access Road No.1 West side of Hwy 384, +2.5 on Existing Access Road No. 2, East side of Hwy 384). Approximately 3,225 tons of recycled concrete were used to elevate the roadways. Two Portable Multi-Parameter Water Quality Troll 9500 units were provided through this contract and installed by Simon & DeLany for operation of Structures No. 1 and No. 12. Completion and final acceptance was on June 28, 2006.

Engineering, Design ,Surveying,	
Construction Oversight & As-Builts	\$ 26,705.00
Construction Cost	\$150,000.00

TOTAL CONSTRUCTION COST	\$176,705.00
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June 2006 – F. Miller & Sons

Provide labor, material and equipment to refurbish and install flap gate on west culvert of Structure No. 12. This flap gate was vandalized during spring of 2006. Completion and final acceptance was on June 28, 2006.

TOTAL CONSTRUCTION COST	\$1,600.00
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March 2007 – Simon & Delany

Provide labor necessary to remove and dispose of trash and debris which has accumulated within the hyacinth fence and adjacent to the sluice gates at Structure No.1

TOTAL CONSTRUCTION COST	\$900.00
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May 2010 – Simon & Delany

Provide labor necessary to remove and dispose of trash and debris which has accumulated within the hyacinth fence and adjacent to the sluice gates at Structure No.1

TOTAL CONSTRUCTION COST	\$2,000.00
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October 2011 – Simon & Delany

Provide labor necessary to install bird excluder devices on the solar panels and install plastic pile caps on Structures No. 1 and No. 12.

TOTAL COST	\$1,300.00
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November 2013 – Simon & Delany

Provide labor and equipment necessary to remove vegetation and debris adjacent to the hyacinth fence, inlet sluice gates, and outlet flap gates at Structure No. 1.

TOTAL CONSTRUCTION COST	\$2,800.00
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March 2015 – CC Lynch

Provide labor and equipment to replace the Aqua Troll 200 Base Unit Level Sensor at Station 29r on Structure No. 1

TOTAL COST	\$2,529.50
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May 2015- Patriot Construction

Royal Engineers was tasked with design engineering, bidding, surveying, and construction oversight and administration. The Engineering Contract included evaluation surveys of the existing staff gauges and installation of new staff gauges. Patriot Construction provided labor, material and equipment to repair and existing earthen levee north of Structure No. 1, dredge the inlet channel to Structure No. 1, repair the board walkways, and clean debris from around the culverts and flaps. Fill material was brought in to raise and reshape 1174 linear feet of the existing earthen levee to the original elevation of +3.5 NAVD88. Approximately 1128ft of the inlet channel from the GIWW to Structure No. 1 was dredged to an elevation of -2.11ft. The Contract Completion date was October 16, 2015 and final acceptance was issued January 15, 2016.

Engineering Design, Surveying, Construction Oversight & As-Builts	\$ 67,762.25
Construction Cost	\$ 99,154.49

TOTAL CONSTRUCTION COST	\$166,916.74
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February 2016 - CC Lynch

Provide labor and equipment to replace the Troll Link 101 telemetry system with a Tube 300R Telemetry System (3G modem) at Stations 29r and 15r for structures No. 1 and No. 12 respectively. In addition to equipment and labor, the data service cost is included for a 12 month period.

TOTAL COST	\$3,285.50
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October 2016 – Simon and Delany

Provide labor and materials to replace the one missing PVC pile cap on the piles at Structure No. 1's hyacinth fence and replace the staff gauge on the Structure No. 12 outlet side.

TOTAL COST

\$585

Structure Operations: CPRA is currently under contract with Simon and Delany Resource Management for the structure operations. The structures are manipulated in accordance with the operation schedule outlined in the Operation and Maintenance Plan and USACE Permit. Copies of the quarterly reports that are provided as well as a copy of the operations contract between CPRA and Simon & DeLany are attached in the "Structure Operations" section of the CS-21 Hwy. 384 Operation & Maintenance Plan.

The original operating procedures for the Structure No. 1 was based on water level only with no provision for salinity control. However, evaluation of historical records for the structure showed salinities of 9+ ppt. The operations procedure was modified to close the Structure No. 1 sluice gates at 7 ppt. Operations for Structure No. 12 were not changed. The real time conditions at Structures No.1 and No. 12, are uploaded to the website, www.hydrovu.com. Access can be obtained by CPRA personnel with the appropriate email and password. Note when reviewing the data that Monitoring Station 15r is located near Structure No.12, and Station 29r is located at structure No.1.

V. Inspection Results

Structure No.1 (Freshwater Introduction Structure)

The structure and inlet channel are in good condition. The inlet channel which was dredged in 2015 is still supplying freshwater to the structure; however, sediment has deposited around the hyacinth fence, the culvert inlets and on the project interior adjacent to the structure. The collection of sediment has restricted the flow through the culverts and prevents the flaps from opening properly. Currently limited flow is passing through two of the three culverts. Flow can be restored by cleaning out adjacent to the structure to allow the flaps to operate as intended.

The levee north of the structure which was repaired in 2015 is intact with no signs of erosion. The water level on the inside of the project at Structure No. 1 was at -0.4ft elevation. The water level on the outside was not measurable due to the sediment around the staff gauge.

The board walkways are in good conditions since being replaced. An ever increasing amount of vegetation has established itself on the inside of the project area near Structure No. 1. There is evident submerged vegetation in the cove north of the structure. (See Appendix B, Photos 1-4)

The levee (previously noted as Existing Access Road No.2) leading up to the structure is in good condition since it was repaired in June 2006.

Structure No. 12 (Salinity Control Structure)

The structure is in good condition. The water level was very low. The staff gauge read -0.6ft on the inside and -0.7ft on the inside. The vegetation on the terraces was plentiful and expanding. The board walkways were in good condition. (Appendix B, Photos 5&6)

Site No. 8

The rock plug was in excellent condition. Vegetation has expanded along the rock plug on the lake side and on the interior. Open water in the marsh interior can no longer be seen from the rock plug. (Appendix B, Photos 7&8)

VI. Conclusions and Recommendations

Overall, the Hwy. 384 Hydrologic Restoration Project is in good condition and functioning as designed. The expansion of vegetation within the project has been prevalent and has spread into areas which were visibly open water during the previous inspection. Particularly, this can be seen in the vicinity of Structure No. 1 where sediment has deposited and new vegetation has taken hold over the last year. (Appendix B, Photos 9-11) Dredging of the inlet channel in 2015 and restoring the flow into the project had a major impact on the changes seen.

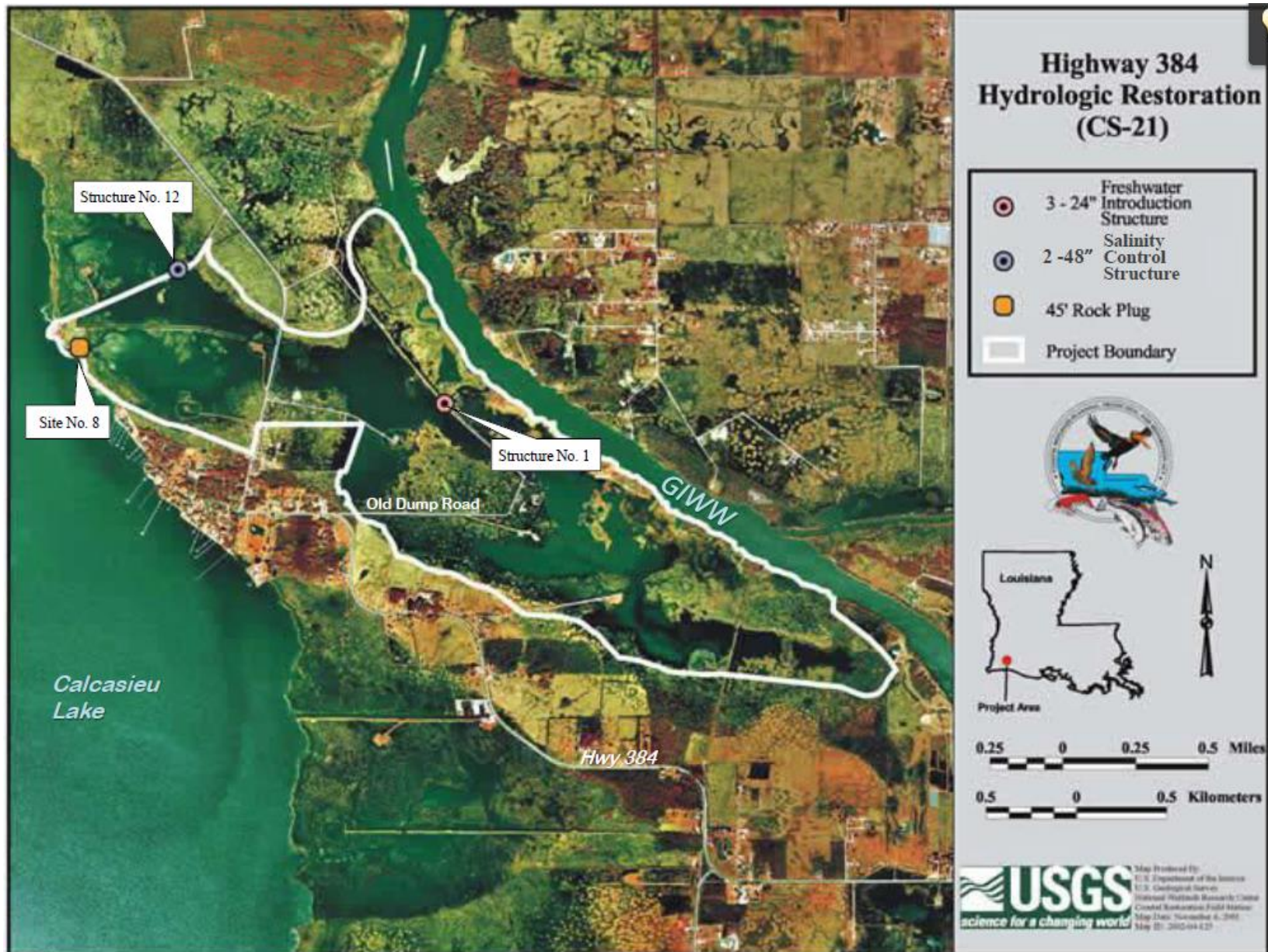
To continue to perform as intended, minor maintenance is needed to clear sediment and debris from the vicinity of Structure No. 1. This would restore flow into the project.

The following improvements have performed well in this project and should be considered in future projects of this type:

- The hyacinth fence installed during the maintenance project of June 2002
- The rock reinforcement of the bankline at the structures
- The use of recycled concrete material used to repair the access road
- The two InSitu Aqua Troll 200 Sonde units used for operation of the structures

Appendix A
Project Features Map

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Appendix B

Photographs



Photo No. 1, Structure No.1, Project Interior



Photo No. 2, Structure No.1, Inlet Channel, Hyacinth Fence and Operations Equipment



Photo No.3, Structure No.1, Culverts - Sediment



Photo No. 4, Inlet Channel to Structure No.1, Last Dredged in 2015

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Photo No. 5, Structure No. 12, Inlet Side



Photo No. 6, Structure No. 12, Outlet Side



Photo No. 7, Structure No. 8, Rock Plug Looking South towards lake



Photo No. 8, Structure No. 8, Rock Plug - Vegetation on Project Interior

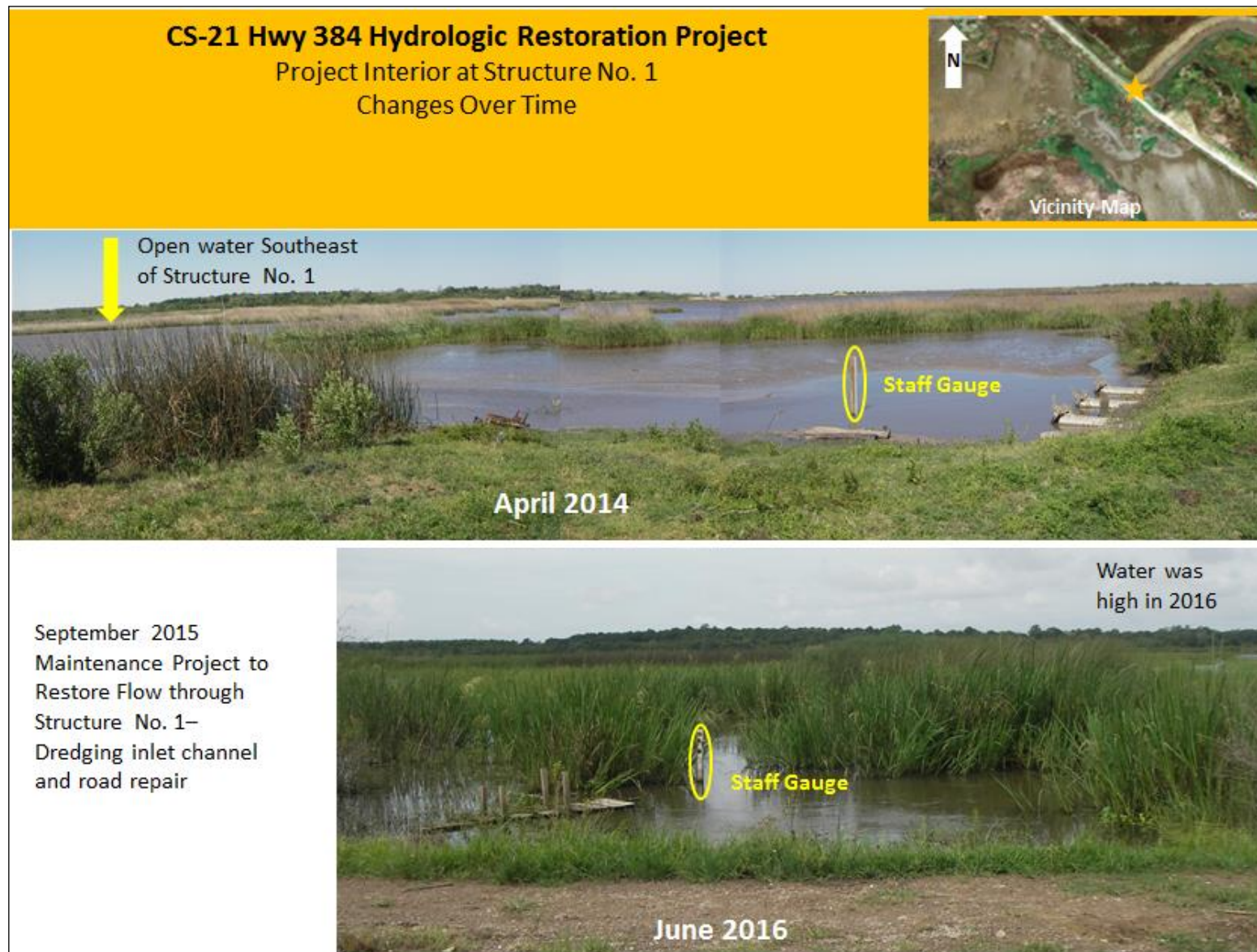


Photo No. 9, Vegetation Changes Over Time (2014- 2016): Project Interior –Structure No.1



Photo No. 10, Vegetation Changes Over Time (2017): Project Interior –Structure No. 1

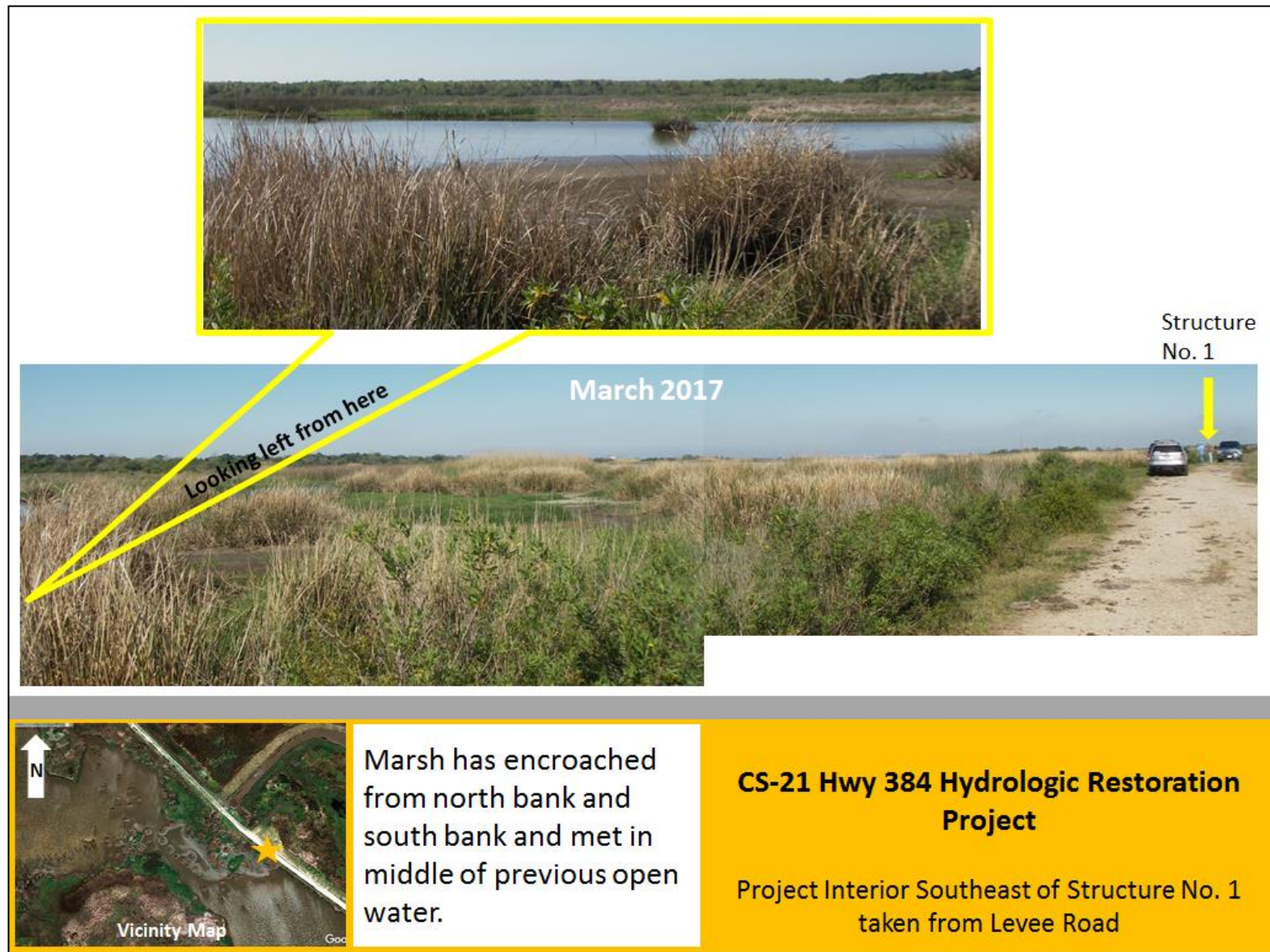


Photo No. 11, Vegetation Changes Over Time (2017): Project Interior – Southeast of Structure No. 1



**CS-21 Hwy
384
Hydrologic
Restoration
Project**

Project Interior
taken Northwest
of Structure No.
1 on levee road.

Water was high in
2016 and low in
2017 but the
changes in the
marsh elevation
are still evident.



Photo No. 12, Vegetation Changes Over Time (2017): Project Interior – Northwest of Structure No. 1



September 16, 2003

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April 7, 2010



March 4, 2012



March 13, 2017

Appendix C

Three Year Budget Projection

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HWY 384/ CS-21 / PPL 2
Three-Year Operations & Maintenance Budgets 07/01/2017 - 06/30/2020

<u>Project Manager</u>	<u>O & M Manager</u>	<u>Federal Sponsor</u>	<u>Prepared By</u>
Pat Landry	Jody White	NRCS	Jody White

	2017/2018 (-18)	2018/2019 (-19)	2019/2020 (-20)
Maintenance Inspection	\$ 7,269.00		
Structure Operation	\$ 10,600.00		
State Administration	\$ 3,000.00		\$ -
Federal Administration	\$ -		\$ -

Maintenance/Rehabilitation

17/18 Description: Equipment Removal

E&D	
Construction	\$ 3,000.00
Construction Oversight	\$ -
Sub Total - Maint. And Rehab.	\$ 3,000.00

18/19 Description:

E&D	\$ -
Construction	
Construction Oversight	\$ -
Sub Total - Maint. And Rehab.	\$ -

19/20 Description:

E&D	\$ -
Construction	\$ -
Construction Oversight	\$ -
Sub Total - Maint. And Rehab.	\$ -

	2017/2018 (-18)	2018/2019 (-19)	2019/2020 (-20)
Total O&M Budgets	\$ 23,869.00	\$ -	\$ -

O & M Budget (3 yr Total)	\$ 23,869.00
Unexpended O & M Budget	\$ 27,800.00
Remaining O & M Budget (Projected)	\$ 3,931.00

Appendix D

Field Inspection Form

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MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: CS-21 Hwy. 384

Date of Inspection: 03-23-17 Time: 10:20am

Structure No. 1

Inspector(s): Jody White and Stan Aucoin (CPRA),
 Dale Garber (NRCS), Chris Simon (Simon & Delany)

Structure Description: 3-24" Culverts

Water Level: Inside -0.4ft Outside

Type of Inspection: Annual

Weather Conditions: sunny and mild, low water due to front/north
 wind

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	N/A				
Flapgates/Outlet Pipe	Fair			1	Sediment has restricted the flapgates from opening all the way.
Inlet Channel	Good			2&4	Inlet channel is in good condition after the 2015 dredging project; however, sediment has collected adjacent to the hyacinth fence, and culverts
Hardware/Sluiceways	Good			2	All gates are open but only two are partially flowing water due to sediment against the structure
Hyacinth Fence	Good			2-4	Sediment, debris and vegetation is accumulating since the 2015 maintenance event.
Timber Piles	Good			2-4	
Timber Wales	N/A				
Plastic Pile Caps	Good			2 & 4	pile caps are in place
Cables	N/A				
Signage /Supports				1 & 2	Staff Gauges were replaced on the inlet and outlet side in 2014 with reference to NAVD88 Geoid12A
Staff Gauges	Good				
Rip Rap embankment	Good				
InSitu AquaTroll 200 - 29r	Good			2	Telemetry has been replaced with a 300R tube unit and ATT 3G services. Sonde was not operational due to sediment around it.
Levee/ Access Roadway	Good				Roadway is in good condition due to the 2015 maintenance to the area north of structure no 1.

What are the conditions of the existing levees? good
 Are there any noticeable breaches?
 Settlement of rock plugs and rock weirs?
 Position of stoplogs at the time of the inspection?
 Are there any signs of vandalism?

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MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: CS-21 Hwy. 384

Date of Inspection: 03-23-17 Time: 11:20 am

Structure No. 8

Inspector(s): Jody White and Stan Aucoin (CPRA)

Dale Garber(NRCS), Chris Simon - Simon and Delany

Structure Description: Rock plug

Water Level: Inside -0.4ft Outside -0.6ft

Type of Inspection: Annual

Weather Conditions: Sunny and mild, low water levels

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	N/A				
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	N/A				
Timber Piles	N/A				
Timber Wales	N/A				
Galv. Pile Caps	N/A				
Cables	N/A				
Signage /Supports	N/A				no longer necessary
Staff Gages					
Rip Rap (plug)	Good			7 & 8	The rock plug is in tact and vegetation has expanded along the plug on the lake side. Besides the small channel there is no longer any open water visible from the plug in the project interior.
Earthen Embankment					

What are the conditions of the existing levees?

Are there any noticeable breaches?

no

Settlement of rock plugs and rock weirs?

no

Position of stoplogs at the time of the inspection?

Are there any signs of vandalism?

no

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MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: CS-21 Hwy. 384

Date of Inspection: 03-23-17 Time: 11:40 am

Structure No. 12

Inspector(s): Jody White and Stan Aucoin (CPRA)
Dale Garber (NRCS) and Chris Simon (Simon & Delany)

Structure Description: 2-48" Culverts

Water Level: Inside Outside

Type of Inspection: Annual

Weather Conditions: Sunny and mild, low water level due to north
wind

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	N/A				
Steel Grating	Good			5	
Stop Logs	Good			5	
Hardware/Flapgates	Good			6	
Timber Piles	Good			5	
Timber Wales	N/A				
Plastic Pile Caps	Good			5 & 6	Plastic pile caps were in place.
Cables	N/A				
Staff Gages	Fair			5 & 6	Staff gauges on the inlet and outlet side were replaced in 2014 to the GEOID 12A datum.
Rip Rap embankment	Good			5 & 6	Embankment was in good condition.
InSitu AquaTroll 200 - 15r	Good				The telemery equipment has been upgraded to a 300R tube unit with ATT 3G service.
Access Roadway	Good				The access road was in good condition. New limestone was placed in sections on the road by others, possibly due to monitoring well work in the project area and use of the road for access.

What are the conditions of the existing levees? good
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism? no